PATENT ABSTRACTS OF JAPAN

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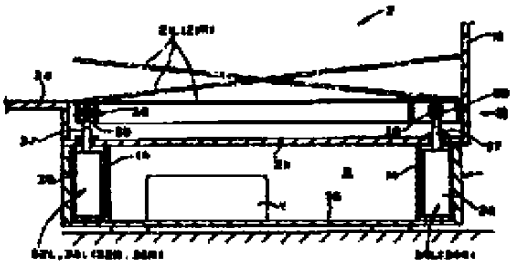
(54) WALK TRAINING DEVICE

(57)Abstract:

PURPOSE: To keep the posture of a movable walking plate identical for a patient along each of his/her outgoing and return walking directions.



CONSTITUTION: A pair of right and left movable walking plates 21L and 21R laid within a walking bathtub 2 for forming a patient's walking path are independently adjusted in an inclination angle along a right and left direction or in a lengthwise direction, and height relative to each other on the operation of cylinder devices 32L to 34L (32R to 34R). When sensors S1, S2 or the like identify that a patient is positioned at the ends of the plates 21L and 21R, the posture thereof is changed between preset posture and reversed posture. The reversed posture is symmetrical with the preset posture in a right and left direction or a lengthwise direction. For example, the plates 21L and 21R in the preset posture, when inclined 20 degrees to rise forward, are inclined by the same degree to rise backward in the reversed posture.

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CLAIMS

[Claim(s)]
[Claim 1]A movable force plate of a right-and-left couple which constitutes a patient's walk road achieves individual independence mutually, and is allocated as change of the posture condition being possible, A driving means for achieving individual independence and changing a posture condition of a movable force plate of said right and left is established, and said driving means is controlled, A predetermined setting-out posture condition when going a posture condition of a movable force plate of said right and left which was mutually different in a longitudinal direction to the other end side from the longitudinal direction one end part side of a movable force plate, A gait training apparatus characterized by what it has a reversal control means for making a posture condition change between reversal posture states made into this setting-out posture condition with a symmetrical posture condition in a longitudinal direction for.
[Claim 2]A thing provided with a reversal selecting switch for manual operation to be carried out and for operating said reversal control means choose [or or] whether carries out operation prohibition in Claim 1.
[Claim 3]When it is detected that had a position position detecting means to which a patient was located in a longitudinal direction end of a movable force plate and which carries out thing detection in Claim 1, and a patient was located in a longitudinal direction end of said movable force plate by said position detecting means, That to which said reversal control means operates and a change of a posture condition between said setting-out posture condition and an inverse point posture condition is made.
[Claim 4]What is used as a sensor which operates when said position detecting

means is established a longitudinal direction end of said movable force plate, or near the and a patient comes to this longitudinal direction end in Claim 3.
[Claim 5]That by which longitudinal direction end ******** of said movable force plate is provided near the, and said position detecting means is considered as a switch by which manual operation is carried out in Claim 3.
[Claim 6]What is beforehand provided with an alarm which generates an alarm in Claim 1 before said reversal control means operates.
[Claim 7]What is provided with a delay means which operates said reversal control means after said alarm operates and carrying out specified time elapse in Claim 6.
[Claim 8]What is set up in Claim 1 as that from which said setting-out posture condition differs in an angle of gradient to a longitudinal direction of each movable force plate of said right and left mutually.
[Claim 9]What is set up in Claim 1 as that from which said setting-out posture condition differs in a height position of a movable force plate of said right and left mutually.
[Claim 10]What is set up so that a movable force plate of said right and left may incline in the longitudinal direction and said reversal inclining state may become symmetrical also in a longitudinal direction of this movable force plate in said setting-out posture condition in Claim 1 to said setting-out inclining state.
[Claim 11]a movable force plate which constitutes a patient's walk road is allocated as change of an inclining state in the longitudinal direction being possible -- a longitudinal direction of said movable force plate -- a driving means for changing an inclining state to kick being established, and said driving means, [control and] A gait training apparatus characterized by what it has a reversal control means for making a posture condition change between reversal inclining states inclined so that it might become [in / to a predetermined setting-out inclining state and this setting-out inclining state / for an inclining state in a longitudinal direction of said movable force plate / a longitudinal direction of this movable force plate] symmetrical for.
[Claim 12]What is made into a walk road [in / in said movable force plate / a walking training organ bath] in any 1 clause of Claim 1 thru/or Claim 11.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention relates to the gait training apparatus for performing a patient's walking training.
[0002]In order to recover a patient's walking function, the walking bathtub (walking training organ bath) is used. Since hot and cold water, especially a massage effect are expected from an inside, this walking bathtub is put into hot water, and a patient walks it in this hot and cold water. The bottom of this walking bathtub serves as a walk road (field) where a patient's sole is contacted, and this walk road is constituted as a flush side level as a whole.
[0003]On the other hand, there are some which aimed at bending functional recovery of an ankle as a patient's walking function recovery. For example, there are some which aimed at talipes-equinus training (bending functional recovery of the sliding direction of an ankle), talipes-valgus training (bending functional recovery to the longitudinal-direction outside of an ankle), and club-foot training (bending functional recovery to the longitudinal-direction inside of an ankle). On land, training of this etc. applies a patient's own weight to the ankle in the state where bent and the function was bent in the direction which is not enough, when a patient gets in on the base plate inclined in the prescribed direction.
[0004]
[Problem to be solved by the invention]Since it will have to become quite tight since the conventional ankle bends and a patient's weight is added in functional recovery training succeeding an ankle, and the patient has to be doing intently during functional recovery training, it is easy to get bored with training.

[0005]For this reason, it considers carrying out by constituting the walk road which a patient walks as a movable force plate which can change posture conditions, such as an inclining state, and doubling walking training and ankle functional recovery training. It is idea ******** to develop such a movable force plate, to constitute a movable force plate from a movable force plate of the right-and-left couple which achieved separate independence by the object for right legs and the object for left legs that it should cope with that the obstacle degrees of an ankle function on either side differ, and to change the posture condition, especially inclining state by right and left.

[0006]However, if the angle of gradient in the longitudinal direction of a movable force plate on either side is mutually changed, for example for anti-leg training, If it turns to the other end side from the walking direction, i.e., one end part of longitudinal direction, side of a movable force plate, even if it sets up as a thing convenient for a patient, about the walk of a counter direction which goes to the one end part side from the other end side, an inclining state does not become a thing corresponding to the obstacle degree of the ankle on either side. For this reason, it will be forced for a patient to once get down from a movable force plate, and to walk a movable force plate only from a uniform direction. This has an obstacle in one side of the leg a patient's right and left, and where the height position of a movable force plate on either side is changed, also when performing walking training, it produces the same problem. The same problem is produced, also when making a movable force plate incline in the longitudinal direction and performing talipes-equinus training.

[0007]When the above situations were taken into consideration, it was made and it performs walking training using the movable force plate which can change a posture condition, this invention, There is a posture condition of a movable force plate in providing the gait training apparatus which enabled it to take the same posture condition to a patient also in the case of the walk to the one end part side from the other end side also in the case of the walk to the other end side from the one end part side of a movable force plate, without once getting down from a movable force plate.

[0008]

[Problem to be solved by the invention]In order to attain said purpose, this invention has been performed as follows as the 1st composition. Namely, the movable force plate of the right-and-left couple which constitutes a patient's walk road achieves individual independence mutually, and is allocated as change of the

posture condition being possible, The driving means for achieving individual independence and changing the posture condition of the movable force plate of said right and left is established, and said driving means is controlled, A predetermined setting-out posture condition when going the posture condition of the movable force plate of said right and left which was mutually different in the longitudinal direction to the other end side from the longitudinal direction one end part side of a movable force plate, This setting-out posture condition is used with composition [like] provided with the reversal control means for making a posture condition change between the reversal posture states made into the symmetrical posture condition in the longitudinal direction. The desirable mode on condition of the above-mentioned composition is as [according to claim 12] Claim 2 in Claims - Claim 10.

[0009]In order to attain said purpose, this invention has been performed as follows as the 2nd composition. namely, -- the movable force plate which constitutes a patient's walk road is allocated as change of the inclining state in the longitudinal direction being possible -- the longitudinal direction of said movable force plate -- the driving means for changing the inclining state to kick being established, and said driving means, [control and] It has composition [like] provided with the reversal control means for making a posture condition change between the reversal inclining states inclined so that it might become [in / to a predetermined setting-out inclining state and this setting-out inclining state / for the inclining state in the longitudinal direction of said movable force plate / the longitudinal direction of this movable force plate] symmetrical. The desirable mode on condition of the above-mentioned composition is the passage according to claim 12 in Claims.

[0010]

[Effect of the Invention]According to invention indicated to Claim 1, by making a posture condition change between a setting-out posture condition and a reversal posture state, When a patient turns to a transverse plane, i.e., the front, and walks a movable force plate top, the posture condition of the movable force plate to a patient is made the same in the time of going to the other end side from the longitudinal direction one end part side of a movable force plate, and the time of going to the one end part side from the other end side concerned. It becomes possible to go and come back to a movable force plate, and to perform the same training continuously, without being able to come, being and a patient once getting down from a movable force plate more.

[0011]When it is not necessary to go, come back to and train a movable force plate by having composition which was indicated to Claim 2, it can avoid performing unnecessary reversal control.
[0012]It checks that the patient has been to the longitudinal direction end of a movable force plate by having composition which was indicated to Claim 3, That is, with the direction which the patient has walked till now, it can check having become a cuff position which starts the walk to an opposite direction, a change to the posture condition according to the next walking direction can be made, and alteration time of a posture condition can be made suitable.
[0013]By having composition which was indicated to Claim 4, when automating reversal control fully, it will become desirable. By having composition which was indicated to Claim 5, manual setting out of the posture condition change is carried out at the suitable stage according to a patient, and when aiming at uneasy reduction to the patient resulting from change of a posture condition, etc., it will become desirable.
[0014]By having composition which was indicated to Claim 6, as it gives beforehand a patient and the nursing persons of the circumference that a posture condition change is made, namely, a posture condition change is not made suddenly, when preventing beforehand the unexpected accident resulting from posture condition change, it will become desirable. After being warned by an alarm, time until a patient takes the posture corresponding to posture condition change is secured, and when it makes a posture condition change safely that a posture condition change is made by having composition which was indicated to Claim 7, it will become very desirable.
[0015]By having composition which was indicated to Claim 8, a round trip can perform anti-leg training similarly. When giving a level difference to right and left by one side of a leg on either side having an obstacle by having composition which was indicated to Claim 9 etc. and carrying out walking training, a round trip can be trained similarly. When doubling talipes-equinus training and performing it by having composition which was indicated to Claim 10, a round trip can be trained similarly.
[0016]According to invention indicated to Claim 11, when carrying out talipes-equinus training, a round trip can be trained similarly.
[0017]When carrying out walking training in a walking training organ bath by having composition which was indicated to Claim 12, the effect acquired by each claim mentioned above can be acquired.

[0018]
[Working example]It explains based on the Drawings which attached the embodiment of this invention below. In drawing 1 and drawing 2, 1 is a training organ bath and this training organ bath 1 really which opened the walking bathtub (walking training organ bath) 2 and the bathing organ bath 3 for free passage comprises an embodiment as a thing of form. ON (as opposed to training organ bath 1) getting out of the bath of the patient is carried out to the bathing organ bath 3 using the known lifter 5, ridden on the stretcher 4.
[0019]In the side attachment wall 11 and the bathing organ bath 3 of the right-and-left couple which constitutes the walking bathtub 2, on the whole, it can be transparently formed by an acrylic resin plate etc., respectively, the end wall 12, i.e., the front wall, of an opposite hand, and, on the whole, the patient under walking training can observe it now from the outside easily and clearly.
[0020]A patient walks in the walking bathtub 2, that is, the walk road where a patient's sole is contacted is constituted by the movable force plates 21L and 21R of the right-and-left couple. Each of these movable force plates 21L and 21R can take selectively the following 1st - the 5th posture condition, respectively.
[0021]It is considered as an abbreviated horizontal state, respectively, and is considered as the reference bottom face 2a and same height of a line organ bath, and 1st posture condition each movable force plates 21L and 21R are the posture conditions from which the walk road constituted by the pars basilaris ossis occipitalis of a walking bathtub constitutes a flat-tapped flush side as a whole, and will be in the state which performs and shows hatching by drawing 3. Of course, it is the same as the bottom state of the former to a certain walking bathtub in this 1st posture condition.
[0022]It inclines in a cross direction, and 2nd posture condition each movable force plates 21L and 21R are the posture conditions which will be in the state where front going up or a front falls, and the drawing 2 alternate long and short dash line, the alternate long and short dash line of drawing 3, and the two-dot chain line have shown them. The overall inclining state is shown in drawing 6, and the angle of gradient is shown by theta 2. Of course, this 2nd posture condition becomes talipes-equinus training. The angle of gradient theta 2 of the movable force plates 21L and 21R on either side can be set up it be mutually different (one angle of gradient theta 2 may be zero).
[0023]It is in a state inclined in a longitudinal direction, and a situation of an inclination when a situation of the overall inclination is seen from the front to

drawing 8 again is shown in drawing 7 so that each movable force plates 21L and 21R of the 3rd posture condition right and left may become higher than the outside in the longitudinal-direction inside, and the inside theta 3 of a figure shows an angle of gradient of a longitudinal direction. Of course, this 3rd posture condition becomes talipes-valgus training. what is set up so that the angle of gradient theta 3 of the movable force plates 21L and 21R on either side may be mutually different -- it has become (one angle of gradient theta 3 may be zero).

[0024]It is in a state inclined in a longitudinal direction, and a situation of an inclination when a situation of the overall inclination is seen from the front to drawing 10 again is shown in drawing 9 so that each movable force plates 21L and 21R of the 4th posture condition right and left may become higher than the inside in the longitudinal-direction outside, and the inside theta 4 of a figure shows an angle of gradient of a longitudinal direction. Of course, this 4th posture condition becomes club-foot training. The angle of gradient theta 4 of the movable force plates 21L and 21R on either side is to be set up it be mutually different (one angle of gradient theta 4 may be zero).

[0025]Although the movable force plates 21L and 21R of the 5th posture condition right and left are made into an abbreviation horizontal state, respectively, it is in the state of the height position being mutually different and having a predetermined level difference. The overall situation of this 5th posture condition is shown in drawing 11, and a situation when it sees from the front is shown in drawing 12. And a level difference with the movable force plates 21L and 21R is shown by the mark T. In this 5th posture condition, it can be arbitrarily chosen now whether the movable force plate of the direction which becomes high is made into the left movable force plate 21L, or it is considered as the right movable force plate 21R.

[0026]the [said 1st / the / -] -- it is made for each posture condition of five to serve as the height as the reference bottom face 2a with the same lowest field fundamentally among the upper surfaces of each movable force plates 21L and 22R However, it enables it to have changed the reference height position used as the height of the above but a low field into the position higher than the reference bottom face 2a in the embodiment in consideration of a patient's height, the load which depth of water gives to a patient, etc. so that it may become the optimal depth of water to a patient.

[0027]In order to switch by the 1st which mentioned above the movable force plates 21L and 21R - the 5th posture condition, and in order to change the angles

of gradient theta2-theta4 and level difference T, as shown in drawing 2 and drawing 3, the drive mechanism 31 is formed. This drive mechanism 31 is constituted using two or more cylinder devices allocated under the movable force plates 21L and 21R, the three cylinder devices 32L-34L are formed corresponding to the left movable force plate 21L, and the three cylinder devices 32R-34R are formed corresponding to right movable force plate 21 grade.

[0028]Since it is constituted like right and left, it is explained paying attention to the cylinder device 32L for the lefts - 34L portion, the drive mechanism using the above-mentioned cylinder device referring to drawing 1 - drawing 4 for the detailed structure. First, the three cylinder devices 32L-34L are lengthened and allocated in a sliding direction, and while the cylinder 35 is fixed to the lower end frame 36 of the walking bathtub 2, they are connected with the movable force plate 21L to which the piston rod 37 corresponds, respectively.

[0029]As shown in drawing 1, the two cylinder devices 32L and 33L are allocated in right-and-left parallel in a rear end part of the left movable force plate 21L. The one cylinder device 34L which remains is a front end part of the left movable force plate 21L, and is allocated in the longitudinal-direction mid-position. The piston rod 37 of the cylinder devices 32L and 33L is connected via the swivel joint 39 to the fitting shaft 38 extended to a cross direction fixed to the undersurface of the left movable force plate 21L, respectively.That is, fitting of the ball member 39a of the swivel joint 39 is carried out to a cross direction as only distance being a little slidable to the fitting shaft 38, and the bearing member 39b which carries out the husk of this ball member 39a is being fixed to the piston rod 37 (refer to drawing 4).

[0030]The fitting shaft for the cylinder devices 34L is extended to the longitudinal direction, and the ball member 39a is kept from sliding on it to the fitting shaft 38, although the cylinder device 34L is similarly connected with the movable force plate 21L using the fitting shaft 38 and the swivel joint 39.

[0031]By making possible some relative displacement of the two ball members 39a on the backside to a cross direction to the movable force plate 21L, Change (change by a cross direction) of the connecting position of the movable force plate 21L to the piston rod 37 produced when a posture change is carried out among various posture conditions which the movable force plate 21L mentioned above is absorbed. With the rotatable function of the circumference of 360 degrees according to the swivel joint 39 when changing the above-mentioned posture condition. A smooth posture condition change of the movable force plate 21L is

secured (the virtual rotating shaft line at the time of making the inclination of a cross direction and the inclination of a longitudinal direction perform only comprises automatically achieving individual independence and adjusting the elongation amount of the piston rod 37 in each cylinder devices 32L-34L).

[0032]Drawing 5 shows the example of a hydraulic circuit over each cylinder devices 32L-34L for the lefts. In this drawing 5, the feed route to which the high-pressure oil pressure of the pump 41 is supplied is shown by the mark 42, and the release course which opens oil pressure to the reservoir tank 43 is shown by the mark 44. Each cylinder devices 32L-34L are connected to each courses 42 and 43 via the solenoid operated directional control valves 52L-54L, respectively. Each of these electromagnetism inlet valves 52L-54L are made into 4 port 3 position, and to each cylinder device 32L - every 34L, the state of changing ** length into the state of expanding the piston rod 37, with that position change, and the state of holding achieve individual independence, and are adjusted. It is a relief valve opened when 45 become an accumulator among drawing 5 and the pressure within the feed route 42 becomes beyond predetermined pressure 46.

[0033]Since the relation and its hydraulic circuit of the right movable force plate 21R and the right cylinder devices 32R-34R are also the same as that of the thing for the lefts, the duplicate explanation is omitted. In the hydraulic circuit shown in drawing 5, it is supposed except for a cylinder device and a change-over valve that it is common to right and left. Unitization of the hydraulic equipment except the cylinder devices 32L-34L, 32R-34R is carried out among the various hydraulic equipment shown in drawing 5, and this hydraulic equipment by which unitization was carried out is shown by the mark Y in drawing 2 and drawing 3.

[0034]Here, the bottom of the portion which stores the hot and cold water of the walking bathtub 2 is substantially constituted by bottom wall 2b which exists caudad a little [of the movable force plates 21L and 21R] (refer to drawing 3). And the hydraulic equipment Y by which unitization was carried out is located in the storage space X of the lower part of bottom wall 2b. The piston rod 37 has penetrated bottom wall 2b slidably.

this penetrating part -- the seal member 13 -- liquid -- the seal is carried out densely.

the cylinder 35 allocated in the storage space X -- the cover member 14 -- overall -- liquid -- it is covered densely.

Said seal member 13 is faced the upper part of this cover member 14, and the hot and cold water which leaked and came out from the seal member 13 concerned is

stored in the cover member 14.
And the opening and closing valve for hot-and-cold-water omission (graphic display abbreviation) is connected to the cover member 14.
[0035]Drawing 13 shows the control system for achieving individual independence and controlling the posture condition of the movable force plates 21L and 21R on either side by achieving individual independence and controlling said solenoid operated directional control valves 52L-54L, 52R-54R. The buzzer for alarms and 63 are the lamps for alarms switch panel for the control unit constituted using the micro computer and 61 to choose a variety of information in the inside U of drawing 13 (input), and 62.
[0036]The above-mentioned switch panel 61 is constituted as shown, for example in drawing 14. The various switches (or dial) formed in this switch panel 61 are as follows. The setting variation switch 71 is operated as a thing for ordering it the start of change, when changing the 1st of the movable force plates 21L and 21R - the 5th posture condition, the angles of gradient theta2-theta4, the level difference T, or reference height.
[0037]The five mode switches 72X, 72A-72D are formed. The mode switch 72X is an object for dominant mode selection, and the movable force plates 21L and 21R on either side are abbreviation levels, respectively, and it is selection in the state where it is mutually considered as a same height position.
It is chosen when choosing the 1st posture condition.
The mode switch 72A is an object for selection in the mode A, and is for choosing the 2nd posture condition that becomes talipes-equinus training. The mode switch 72B is an object for selection in the mode B, and in order that it may choose the 3rd posture condition or the 4th posture condition which becomes training of the talipes valgus or a club foot, it is a thing. The mode switch 72C is an object for selection in the mode C, and is for choosing the 5th posture condition. The mode switch 72D is an object for compound mode selection, and is a thing when choosing two or three arbitrary combination from among the 2nd posture condition - the 5th posture condition.
[0038]Corresponding to the mode switches 72A-72C, the mode switches 73A-73C for choosing more detailed contents and the level switches 74A-74C are formed. The mode switch 73A is for choosing whether it is considered as front going up, or a front falls and it ** in the 2nd posture condition. The mode switch 73B is for performing selection between the 2nd posture condition and the 3rd posture condition. The mode switch 73C is for choosing any are made into the higher one

among the movable force plates 21L and 21R on either side.
[0039]The level switch 74A has a common dial when choosing the angle of gradient theta 2 in the 2nd posture condition and choosing the same for the left and the right angle of gradient, and two individual dials for choosing the angle of gradient according to right-and-left individual. The level switch 74B has a common dial when choosing the angle of gradient theta 3 in the 3rd posture condition or the 4th posture condition, or theta 4 and choosing the same for the left and the right angle of gradient, and two individual dials for choosing the angle of gradient according to right-and-left individual. The level switch 74C is for choosing the level difference T.
It consists of one dial.

[0040]The switch 75 sets up a reference height position.
When it consists of one dial and zero are chosen, reference height is in agreement with the reference bottom face 2a (when dominant mode is chosen and zero are chosen as a reference height position, the bottom of the walking bathtub 2 is made into a flush side as a whole like a certain usual walking bathtub from the former).
The switch 76 chooses whether a difference on either side is produced among the movable force plates 21L and 21R.
It is applied only when the mode A or the mode B is chosen.

[0041]The switch 77 is for choosing whether automatic reversal is made to perform so that a relation with the movable force plates 21L and 21R on either side may turn into a reverse relation, when the patient in the walking bathtub 2 is located in the walk stroke edge. Namely, as shown in drawing 12 for example, where the left movable force plate 21L is made into a position higher than the right movable force plate 21R, When a patient walks and it comes to the front end of the walking bathtub 2, and carrying out a back walk as it is and moving towards the rear end of the walking bathtub 2, without a patient changing direction 180 degrees, the height relation of the movable force plates 21L and 21R of the right and left to a leg on either side does not change at all.
[0042]However, direction is changed 180 degrees by a walk stroke edge, and when carrying out the transverse-plane walk used as the usual walk mode, the height relation of the movable force plates 21L and 21R of the right and left to a leg on either side will turn into a reverse relation. In such a case, even when a

patient always does a transverse-plane walk (or always back walk) by choosing automatic reversal, the relation of the movable force plates 21L and 21R of the right and left to a leg on either side will always be obtained as a predetermined established state.

[0043]When automatic reversal is chosen, after operating the alarms 62 and 6 beforehand before a reversal start, it is [predetermined time] behind and may be made to perform reversal for safety. It is detected by the pressure-sensitive sensor and the sensors S1 (refer to drawing 13), such as a photosensor, by which it operates that the patient was located in the front end part or rear end part of the movable force plates 21L and 21R as a premise which performs this reversal in response to the weight of the patient who provided in each longitudinal direction end of the movable force plates 21L and 21R. What is necessary is just to form the sensor S1 concerned, when the sensors S1 are things which detect a patient indirectly, such as a photosensor (near [longitudinal direction each] an end (for example, a walking bathtub wall) of the movable force plates 21L and 21R).

[0044]It may be made to be reversed, when [at which it is operated by a patient or the surrounding nursing persons at the front-and-back-ends part of the walking bathtub 2] it provides manual-switches S2 (refer to drawing 13) and this switch S2 is operated (reversal instructions are considered as manual instructions). These manual switches S2 should just form the sensor S1 concerned (near [longitudinal direction each] an end (for example, the walking bathtub wall upper surface etc.) of the movable force plates 21L and 21R, etc.). It may be made to be reversed, only when the sensor S1 detects a patient and the manual switches S2 are operated for safety.

[0045]The switch panel 61 has the display 78 which displays all contents selected with each above-mentioned switch, and selection is completed by checking the contents displayed on this display 78, and operating the confirmation switch 79. The switch panel 61 has the two clear switches 80 and 81. The clear switch 81 is business when correcting contents selected 1 time ago.

The clear switch 82 is business when redoing correction from the beginning. When each switch 79 is operated, all the contents of selection are memorized by RAM of control unit U.

[0046]After operating the switch 71 of a setting variation for facilitating of operation, here, Next, only the switch used as the object which should be operated is indicated by blink (or lighted indication), after ending the selection

about the switch by which it was indicated by blink, all the blinking switches are switched off and the switch used as the object which should be chosen as the next can be indicated by blink. The contents which can come, simultaneously should be chosen at the time can also be displayed on the display 78.

[0047]When the switch 71 is operated, first For example, the mode selection switch 72X, When only 72A-72D are blinked (it indicates that it should choose a mode as the display 78) and the mode A is chosen, The mode switches 72X, 72A-72D which were being blinked until now are made to switch off, and then only the height selecting switch 75 is blinked (it indicates that it should choose height as the display 78). Selection is performed by the same technique as the following. Even if switches other than the switch by which it was indicated by blink are ******(ed), it may be made to perform processing which cancels a manipulate signal.

[0048]It takes into consideration that walking training is performed by the almost same contents to the same patient for facilitating of selection, RAM card 82 which memorized the contents of selection is prepared for every patient, it may read with the reader which formed this RAM card 82 in the switch panel 61, and the read contents may be displayed on the display 78 (operation to step P32 this side of drawing 6 is omitted using RAM card 82). When changing the contents of walking training, the contents of selection can be arbitrarily changed by operating the partial correction switch 83 in the stage which displayed the memory content of RAM card 82 on the display 78 (the level change in the switches 74A-74C usually increases). And when the confirmation switch 79 is operated, the memory content of RAM card 82 is rewritten by the newest contents of selection displayed on the display 78.

[0049]Control unit U controls a cylinder device (solenoid operated directional control valve of business) so that each movable force plates 21L and 21R will be in a desired posture condition, but it has memorized the elongation amount of each cylinder device corresponding to the posture condition which is to some some foundations to the ROM.

In the posture condition which is not memorized by ROM, an operation will determine based on a memory value.

Although feed-forward control may be sufficient as control of a cylinder device, it is preferred to form the actual sensor of a cylinder device which carries out elongation amount detection, and to carry out feedback control of the cylinder device based on the output of this sensor.

[0050]It explains referring to for an example of the control content by control unit U according to operation of the switch panel 61 the flow chart shown in drawing 15 and drawing 16. It is made for a procedure when the dominant mode, the mode A, the mode B, and the mode C which are considered that a flow chart is the most frequently-used are chosen (independent selection) to become easy as much as possible. If the contents which an operator should choose as the display 78 next especially are displayed, when operating selection, it will become much more convenient. In P(it is [below step] the same) 1 of drawing 16, it is distinguished first whether the setting variation switch 71 was operated. At the time of NO, in P2, it is held by this distinction of P1 as the state of the movable force plates 21L and 21R on either side is the actual condition.

[0051]The alarms 62 and 63 operate in order to give a patient and the surrounding person the advance notice that the setting variation of the time of YES is carried out, by distinction of P1. Subsequently, in P4, since the alarms 62 and 63 are operated, it is distinguished whether predetermined time (it is about 5 to 10 seconds in sufficient time to give advance notice) progress is carried out, and an alarm is continued by this distinction of P4 at the time of NO. When set to YES by distinction of P4, the signal input from the switch which gives a setting variation in P5 will be in the state where a permission is granted (the alarms 62 and 63 are stopped at this time), and after this, Mode select (switches 72X, 72A-72D) of P5 and height selection (switch 75) by P6 are performed.

[0052]It is distinguished in P7 whether dominant mode was chosen. At the time of YES, contents selected in P32 of drawing 16 are displayed on the display 78 by this distinction. If this display information is as a request, it will wait for operation of the confirmation switch 79 of P33, and control will be performed so that the state of each movable force plates 21L and 21R may be in the state as display information in P34. It is preferred that only predetermined time operates the alarms 63 and 63 beforehand before execution.

[0053]At the time of NO, selection based on the switches 73A-73C is performed in P8 by distinction of P7. Subsequently, in P9, it is distinguished whether selection in any one mode in the mode A - the mode C is chosen now, or it is in the state where no, i.e., compound mode, is not chosen. By this distinction of P9, at the time of NO, it is a time of compound mode being chosen, and it chooses all the varieties of information that should be compounded in P10 at this time.

Then, after selection of the existence of automatic reversal is performed in P11, it shifts to P32.

[0054]At the time of YES, it is distinguished in P21 of drawing 16 by distinction of P9 whether the mode C is chosen. In this distinction of P21, at the time of YES, in P22, after performing level selection by the switch 74C, in P23, the existence of the automatic reversal by the switch 77 is chosen, and it shifts to P32.
[0055]At the time of NO, in P24, after the difference existence of the right and left by the switch 76 is chosen, in P25, it is distinguished by distinction of P21 whether the state where there is a difference on either side is chosen. In distinction of P25, at the time of YES, in P26, after a level on either side achieves individual independence and is chosen, the existence of automatic reversal is chosen in P27, and it shifts to P32.
[0056]In this distinction of P28 from which it is distinguished whether the mode B is chosen in P28 at the time of NO by distinction of P25, at the time of YES, after a level is chosen in P29, it shifts to P32. At the time of NO, it is a time of the mode A being chosen in distinction of P28.
After a level is chosen in P30 and automatic reversal (reversal of cross direction) existence is chosen in P31 at this time, it shifts to P32.

[0057]Here, reversal of a posture condition is explained more to details. First, as drawing 6 shows, the time of the movable force plates 21L and 21R performing talipes-equinus training inclined in the longitudinal direction is considered. Suppose that that angle of gradient theta 2 is 20 degrees by making into a setting-out inclining state the state where it inclined in front going up like drawing 6 (it corresponds to the drawing 3 alternate long and short dash line) at this time. the reversal posture state corresponding to this setting-out posture condition -- the movable force plates 21L and 21R -- before -- falling (post-going up) -- it becomes and that angle of gradient is made into 20 degrees used as a setting-out posture condition and an identical angle (refer to drawing 3 two-dot chain line).
[0058]The time of performing anti-leg training shown in drawing 7 - drawing 10 is considered. In the angle of gradient (theta 3 or theta 4) of the left movable force plate 21L, at this time, a setting-out posture condition presupposes that the angle of gradient of the right movable force plate 21R is 15 degrees 10 degrees. As for the reversal posture state corresponding to this setting-out posture condition, the angle of gradient of the right movable force plate 21R is made into 10 degrees for the angle of gradient of the left movable force plate 21L 15 degrees.
[0059]The time of performing walking training which gave the level difference

shown in drawing 11 and drawing 12 is considered. Supposing the left movable force plate 21L has [as opposed to / the right movable force plate 21R] a high setting-out posture condition 10 cm at this time, as for the reversal posture state corresponding to this, it will change the right movable force plate 21R into a state higher 10 cm than the left movable force plate 21L.

[0060]Although it is a flow chart which shows drawing 17 a control content when carrying out reversal control, only when the sensor S1 detects a patient and the manual switches S2 are operated, it has been made to be reversed [this flow chart] for safety (posture condition change). That is, a check of that the patient was detected by the sensor S1 (P41), and the manual switches S2 were operated will operate the alarms 62 and 63 (P43). (P42) A check of having carried out specified time elapse from the operation start of the alarms 62 and 63 will perform change of a posture condition (P45). (P44)

[0061]Although the embodiment was described above, this invention includes not only this but the case where it is as follows, for example.

(1) The walking bathtub 2 may be a thing of an independent form, without combining other organ baths. The movable force plates 21L and 21R are not in the walking training organ bath 2, it may be made to use them ashore and the handrail etc. which a patient ****s at that circumference should just install them in this case.

(2) It is for acquiring the 2nd posture condition, and it is good also as one sheet common to right and left, without making a movable force plate into two sheets of right and left, when the 3rd - the 5th posture condition are unnecessary.

(3) Not only an oil pressure controller but a hydraulic system may be sufficient as the cylinder device as a driving source in drive mechanism, and it may be an electrical motor (in this case, what is necessary is just to change rotation of a motor into up-and-down motion of for example, a screw-thread stick, for example using a nut screw-thread stick mechanism).

(4) Four or more cylinder devices may be formed about the movable force plate of one sheet.

(5) As [acquire / so that only any one may be obtained before long / as for the 2nd posture condition - the 5th posture condition, / arbitrary two or three arbitrary combination]

(6) It may be made to constitute a real rotating shaft using a pin etc., without using the rotating shaft at the time of making a movable force plate incline as a virtual rotating shaft like an embodiment. In this case, when [which is not on the

same axis line mutually about a real rotating shaft in order to acquire two or more sorts of inclining states] requiring two or more sorts, For example, what is necessary is just to make other moving mechanisms which remain into an OFF state (operation released state) by making into an ON state (operating state) only the moving mechanism respectively corresponding to [as a variable type (ON, OFF type)] a desired inclining state for the moving mechanism for which two or more sorts of real rotating shafts are constituted. In order to constitute this variable type moving mechanism, while providing the mobile pin in which forward/backward moving is carried out by pneumatic pressure, for example in a walking bathtub, this mobile pin should just form in a movable force plate the rotation hole by which attitude appearance is carried out. In this case, it is premised on a mobile pin being the 1st posture condition as a position which may invade in a rotation hole, It is made to once return to the 1st posture condition in the case of posture condition change, and the mobile pin corresponding to the posture condition selected to after that and last time is made into an OFF state, and selection (ON operation of a corresponding mobile pin) of the real rotating shaft for the posture conditions after change is performed.

[Translation done.]

* NOTICES *

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1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]The top view of the organ bath in which one embodiment of this invention is shown.
[Drawing 2]The side view of drawing 1.
[Drawing 3]The side sectional view showing the details of a movable force plate portion.
[Drawing 4]The expanded sectional view showing the details of a swivel-joint portion.
[Drawing 5]The figure showing the example of a hydraulic circuit over a cylinder device.
[Drawing 6]The perspective view of the movable force plate made into the 2nd posture condition.
[Drawing 7]The perspective view of the movable force plate made into the 3rd posture condition.
[Drawing 8]The figure which looked at the movable force plate made into the 3rd posture condition from the walking direction.
[Drawing 9]The perspective view of the movable force plate made into the 4th posture condition.
[Drawing 10]The figure which looked at the movable force plate made into the 4th posture condition from the walking direction.
[Drawing 11]The perspective view of the movable force plate made into the 5th posture condition.
[Drawing 12]The figure which looked at the movable force plate made into the 5th posture condition from the walking direction.

[Drawing 13]The figure showing the control system to a cylinder device.

[Drawing 14]The front view showing the details of switch panel.

[Drawing 15]The flow chart which shows the example of control of this invention.

[Drawing 16]The flow chart which shows the example of control of this invention.

[Drawing 17]The flow chart which shows the example of control of this invention.

[Explanations of letters or numerals]

2: Walking bathtub

21L: Left movable force plate

21R: Right movable force plate

31: Drive mechanism

32L-34L: Cylinder device

32R-34R: Cylinder device

61: Switch panel

62, 63: Alarm

77: Automatic reversal selecting switch

S1: Sensor (patient detection)

S2: Manual switches

U: Control unit

[Translation done.]

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(54)【発明の名称】　歩行訓練装置

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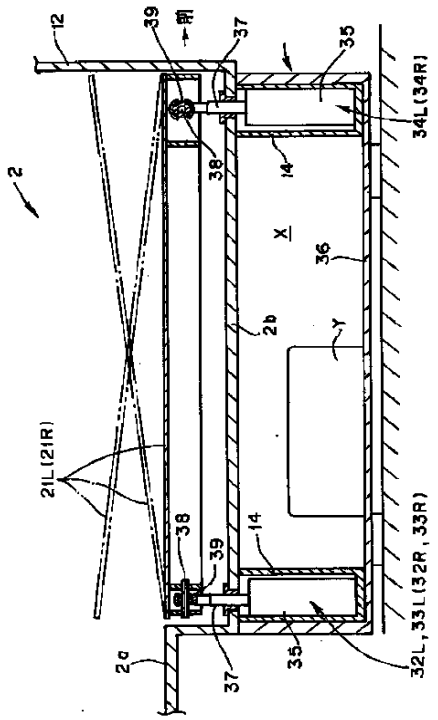

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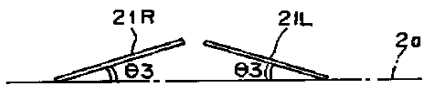
` r Q ″ ‡ Œ ‰ – ˜ ″
æ U Q A U R ″ fi ‡ Œ
U R fi J n ' Ł
˜ i o S S j A p ¤ 10
T j B
y O O U P z ¨ ª { Æ
– Œ , Æ ƒ ¸ Œ
Ø B
1) s Q ″ A …
P ˜ ` fi - ` ~
P k A Q P q ″ A s P ß
• Ø ⁄ ˜ › A –
c ‡ Œ Ø Ł • Ł ″
i 2) Q p ¤ Ø ‰ 20
″ s p ¨ Œ ″ A ´ fi s
¨ › A ¶ E ⁄ ° 28
i 3) fi @ ¥ ¤ fl Ø fi „ 30
ß ‡ fi , ‡ fi ¯
˜ ¢ i – Œ ″ A Æ
p ˜ A | ^ æ] Æ
Œ ¸ 3 B
i 4) P ´ fi s ´ ´ ¢ 38
ª fl ˜ 8
i 5) Q p ¤ ` T p ¤ 50
P ´ ″ Œ Ø ⁄ ¨ 58
Q ´ Ø ¢ ″ C R ´
- ` 8
i 6) ´ fi s ´ X ¸ ‡ „ Ø 70
⁄ ¨ … z æ fi † ˜ • Ø – ˜
fi † ¥ ‹ • Ø ⁄ ˜
X ¸ Ø ‰ A
¨ ¢ ¡ v • Ø Œ ″ A
¥ ‹ • Ø æ fi @ ¥ » Œ … 90
˜ ˜ A] X ¸ 98 100
i fi j ˜ ˜ A
i fi j ˜ • Œ
¥ ‹ • Ø ″ A Æ ƒ ¸

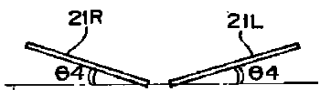
14

s s fl Ø Œ
Œ Ø æ fi E ´ fi s ´
´ fi s ″ æ fi E N

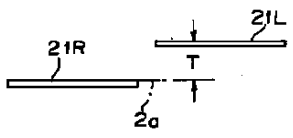
y } 8



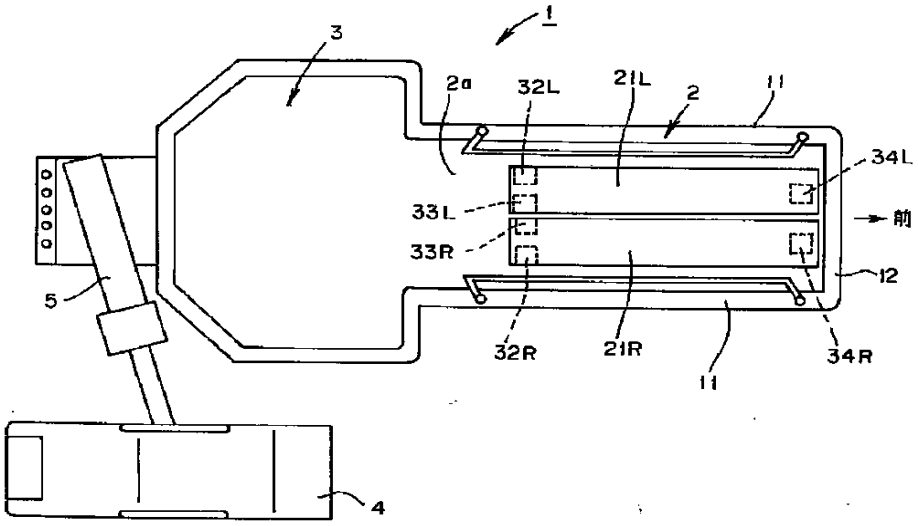
y } 8



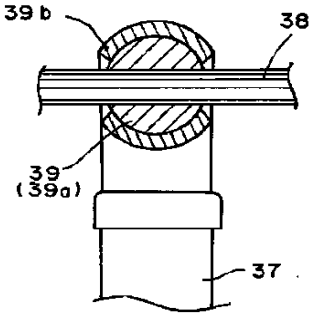
y } 8



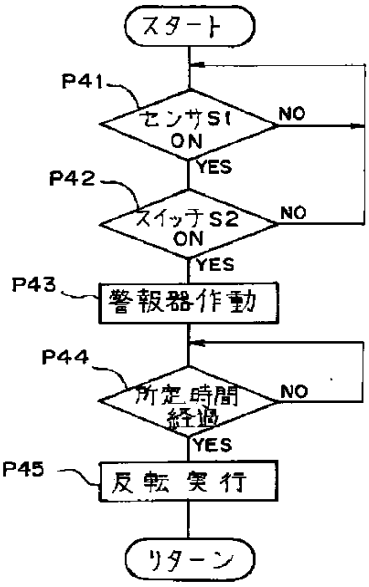
y }E



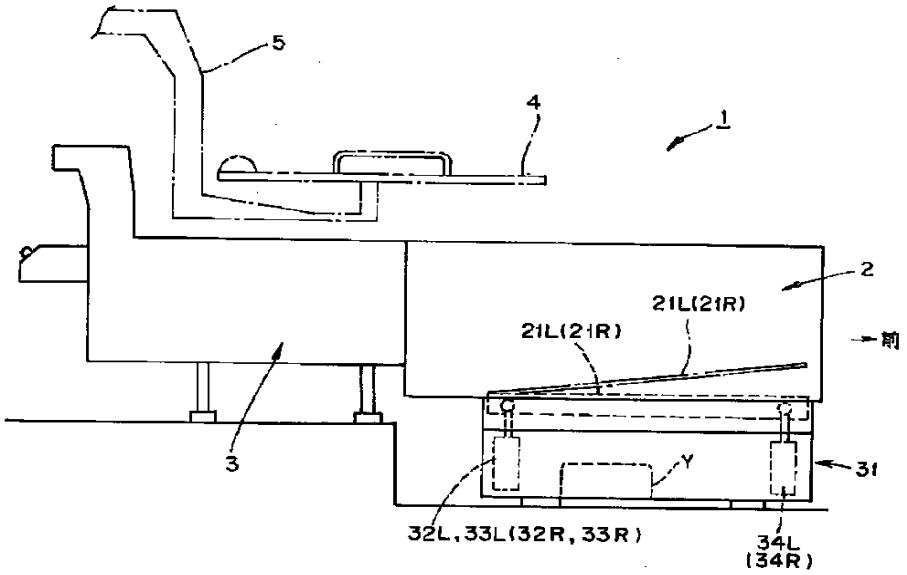
y }S



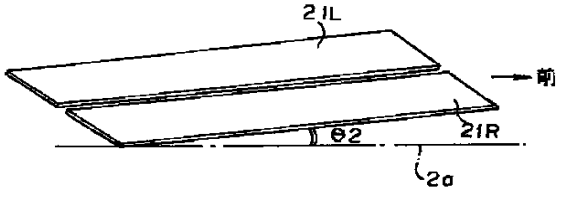
y } E



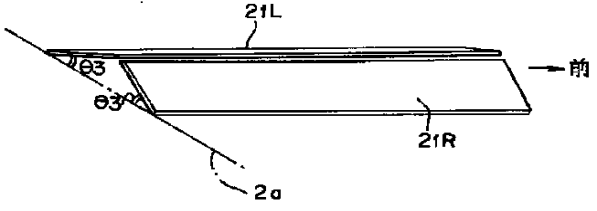
y }@



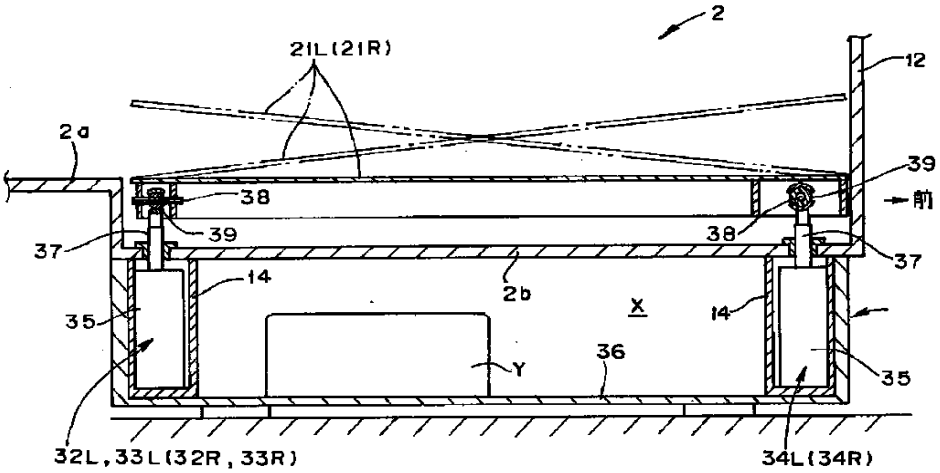
y }B



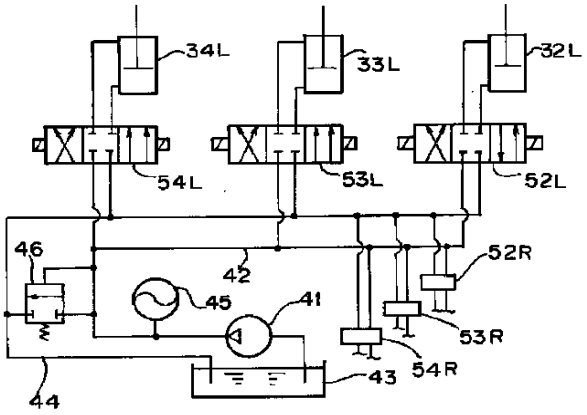
y }C



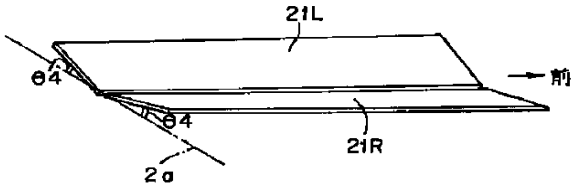
y }E


2
21L(21R)
12
2a
39
前
38
39
38
37
37
14
2b
X
14
35
Y
36
35
32L,33L(32R,33R)
34L(34R)

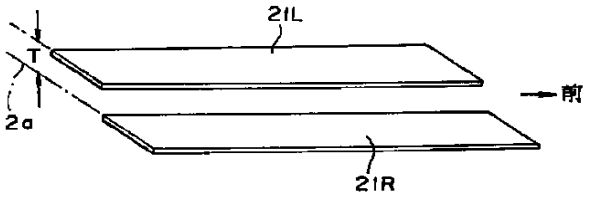
y }F


34L
33L
32L
54L
53L
52L
46
42
52R
45
41
53R
54R
43
44

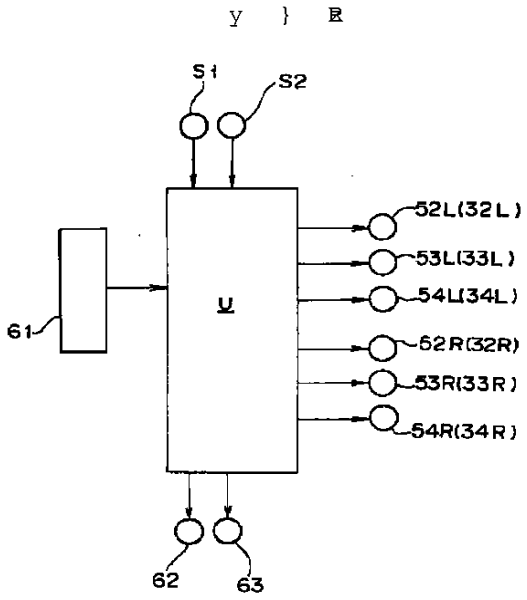
y }G

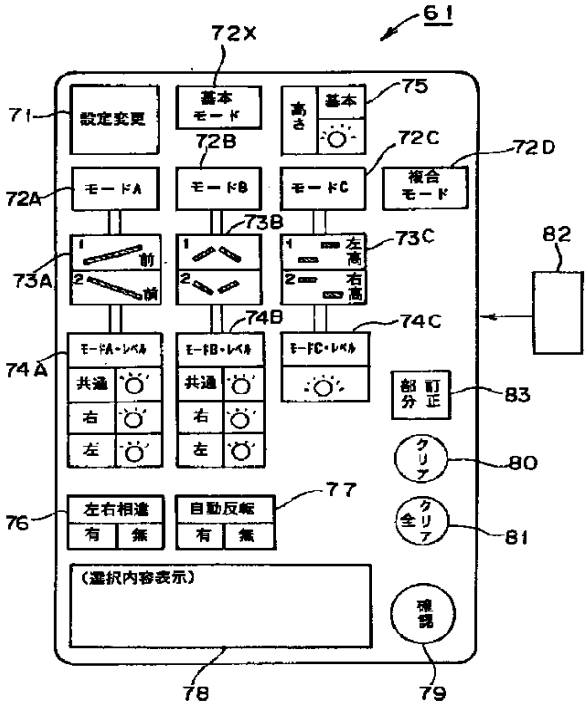

21L
θ4
前
θ4
21R
2a

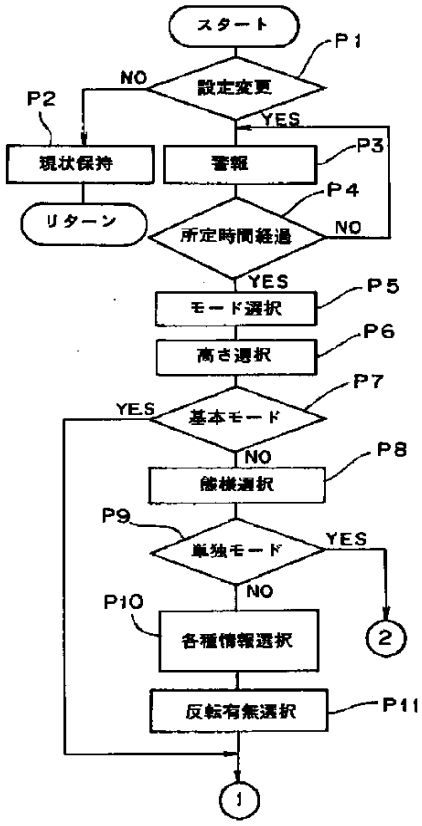
y }H

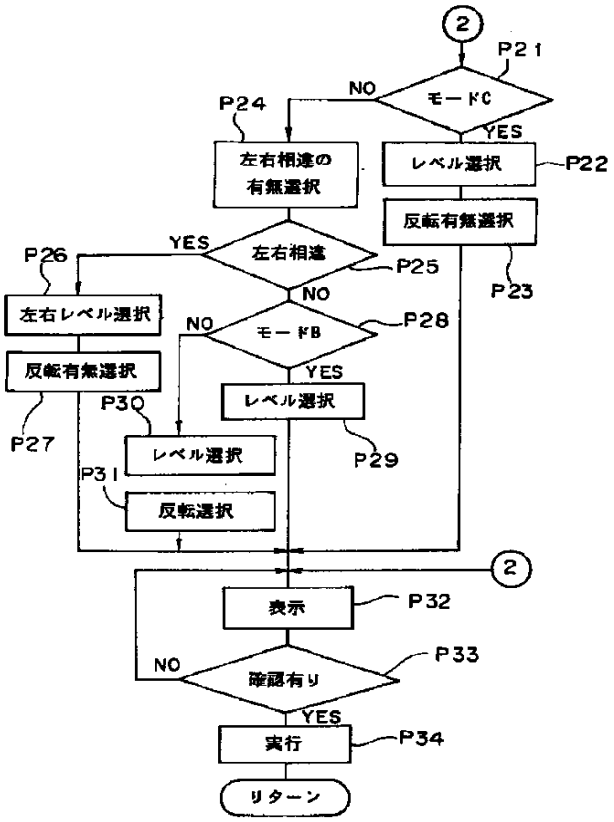

21L
T
前
2a
21R

y }I


S1
S2
52L(32L)
53L(33L)
54L(34L)
52R(32R)
53R(33R)
54R(34R)
U
61
62
63


61
72X
71
設定変更
基本モード
高さ
基本
75
72B
72C
72D
72A
モードA
モードB
モードC
複合モード
73B
73C
82
73A
1 前
2 横
1 左高
2 右高
74B
74C
74A
モードA・レベル
モードB・レベル
モードC・レベル
共通
右
左
姿勢補正
83
クリア
80
76
左右相違
有 無
77
自動反転
有 無
全クリア
81
(選択内容表示)
確認
78
79


スタート
P1
NO
設定変更
P2
YES
現状保持
警報
P3
リターン
P4
所定時間経過
NO
YES
P5
モード選択
P6
高さ選択
P7
YES
基本モード
NO
P8
態様選択
P9
単独モード
YES
NO
P10
各種情報選択
2
反転有無選択
P11
1


2
P21
NO
モードC
YES
P24
左右相違の
有無選択
レベル選択
P22
反転有無選択
YES
左右相違
P25
P23
P26
NO
左右レベル選択
NO
モードB
P28
反転有無選択
YES
レベル選択
P30
P27
レベル選択
P29
P31
反転選択
2
表示
P32
NO
確認有り
P33
YES
実行
P34
リターン